



# YOUNG CHILDREN'S PEER RELATIONSHIPS AND INTERACTIONS IN SMALL GROUP SETTINGS

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Yili Wang





UNIVERSITY  
OF TURKU

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## ABSTRACT

The purpose of the study is to examine children's peer ties, and socio-emotional interaction in small group settings and how these are related together. One of the aims of this longitudinal study is to examine the transitivity, mutuality, and stability of preschool age children's peer relationships over one academic year. Another aim is to observe children's prosocial and problem behaviors in small group settings around tablet computers. It is studied how gender and closeness of friendships influence on young children's relationships and interactions.

Participants of the study included 16 children from a southwestern Finnish preschool. Interview data were collected from the children at five separate time points (total 80 interviews), by using sociometric nomination techniques. Video recordings were gathered around computer sessions and later coded to analyse children's socio-emotional behavior and interactions with their peers. Social network analysis methods were used to investigate the stability and cohesion of the peer relationships, gathered through interviews. Social network analysis was also employed to analyze the density and centrality of the interactions among peers. Further, video-recorded interactions were analyzed to examine what kind of prosocial and problem behaviors there were in small group situations.

The study contributes to the extant literature by describing how children's friendship ties get stabilized during the early childhood. Based on the results, gender has stronger influence than the age of the children. The daily pedagogical arrangements had some influence on peer relationships. The results showed a wide variety in how prosocial and problem behavior took place in small group settings. In all, prosocial behavior was four times more typical than problem behavior, and there were more initiating than responding behaviors. Unexpectedly, a positive correlation between children's peer preference and problem behavior was found. Some possible explanations for this were given. A practical and concise peer interaction observation tool (PIOT) was developed to follow children's social and emotional skills in peer interactions.

**KEYWORDS:** early childhood education, peer relationships, peer interaction, prosocial and problem behaviors, initiating and responding behaviors, social network analysis, observing interaction

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## TIIVISTELMÄ

Tämän väitöskirjan tarkoituksena on tutkia pienten lasten vertaissuhteita ja sosiaalis-emotionaalista vuorovaikutusta sekä miten nämä ovat sidoksissa toisiinsa. Pitkittäistutkimuksen tavoitteena oli selvittää lasten vertaissuhteiden transitiivisuutta, vastavuoroisuutta ja pysyvyyttä yhden lukuvuoden aikana. Tutkimuksessa havainnointiin lasten prososiaalisuutta ja ongelmakäyttäytymistä tietokoneiden äärellä tapahtuvissa pienryhmätilanteissa. Erityistä huomiota kiinnitetään lasten sukupuolen ja ystävyyssuhteiden merkitykseen sekä toimintaan, joka tapahtuu päiväkodin pienryhmätilanteissa.

Tutkimukseen osallistui yhteensä 16 päiväkotilasta, joiden viisi kertaa toistetuissa haastatteluissa kerättiin sosiometristä nimeämistietoa (yhteensä 80 haastattelua) ja videoaineistosta. Sosiaalisen verkostanalyysin avulla tutkittiin lasten vertaissuhteiden pysyvyyttä ja niissä havaittua koheesiota. Videoanalyysien avulla tarkasteltiin lasten keskinäisessä vuorovaikutuksessa ilmenevää prososiaalisuutta ja ongelmakäyttäytymistä. Tutkimuksen merkitys on varhaislapsuuden ystävyyssuhteiden ja vertaisryhmissä tapahtuvan sosiaalis-emotionaalisen käyttäytymisen tarkastelussa päiväkotikontekstissa. Tulosten perusteella lasten sukupuoli vaikuttaa vertaissuhteiden syntymiseen enemmän kuin ikä. Päivittäiset pedagogiset järjestelyt ryhmien kokoonpanoissa vaikuttivat vain vähän vertaissuhteiden muodostumiseen. Tulokset osoittivat suurta vaihtelua prososiaalisen ja ongelmakäyttäytymisen esiintymisessä, lapsia toisiinsa verrattaessa. Kaikkiaan prososiaalisuus oli neljä kertaa yleisempää kuin ongelmakäyttäytyminen ja vuorovaikutuksen aloittamista oli enemmän kuin siihen vastaamista. Hieman yllättävästi havaittiin myös positiivinen korrelaatio lasten toverimieltyymysten ja ongelmakäyttäytymisen välillä. Siihen annetaan tutkimuksessa joitain selityksiä.

Tutkimuksen aikana kehitettiin käytännöllinen ja kompakti vuorovaikutuksen havainnointityökalu (PIOT), jota voidaan hyödyntää lasten sosiaalisten ja emotionaalisten taitojen oppimisen apuna.

ASIASANAT: varhaiskasvatus, vertaissuhteet, vuorovaikutus, prososiaalinen ja ongelmakäyttäytyminen, vuorovaikutuksen aloittaminen ja siihen vastaaminen, sosiaalinen verkostanalyysi, vuorovaikutuksen havainnointi

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*Yili Wang*

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# List of Original Publications

This doctoral thesis is based on the following three studies reported in three original articles, referred to in the text by their Roman numerals. The publishers and the coauthors have granted permissions for the use of these respective publications in this dissertation. Yili Wang was the first author for all three studies and contributed to their conception and design, data collection, analyses and interpretation, and writing the first drafts of the manuscripts and revision. Jarmo Kinos, Tuire Palonen and Yili Wang were mainly responsible with the design of data collection and Yili Wang had the main role in the process of data collection. For data analysis, In Study I, Yili Wang was mainly responsible for the UCINET analysis, and Tuire Palonen and Tarja-Riitta Hurme were responsible for the SIENA analysis. In Studies II and III, Yili Wang conducted SNA analysis by Ucinet by herself so that Yili Wang had the main role there; Yili Wang, Tuire Palonen, and Anu Kajamies were responsible for the video analysis using ELAN, and Yili Wang had the main role. All co-authors participated in the creation of the observational list in PIOT however Yili Wang had the main role. Furthermore, all co-authors provided critical feedback and contributed to all processes of manuscript revisions.

- Study I** Wang, Y.-L., Palonen, T., Hurme, T.-R., & Kinos, J. (2019). Do you want to play with me today? Friendship stability among preschool children. *European Early Childhood Education Research Journal*, 27, 170–184. doi:10.1080/1350293X.2019.1579545
- Study II** Wang, Y.-L., Kajamies, A., Hurme, T.-R., Kinos, J., & Palonen, T. (2018). Now it's your turn: Preschool children's social and emotional interaction in small groups. *Journal of Early Childhood Education Research*, 7(2), 255–281.
- Study III** Wang, Y.-L., Kajamies, A., Hurme, T.-R. & Palonen, T. (Unpublished manuscript). Together with my playmates: Preschoolers' liking ties and interactions in small group settings. Department of Teacher Education, University of Turku, Finland.

# 1 Introduction

Kindergarten children's socialization processes in general and especially their continuously developing skills to build up social relationships with their peers are important parts of pedagogical practices. It is essential for young children to establish harmonious peer relationships. Close friendship ties not only provide companionship and support, but also contribute to the development of children's social skills. Thus, making friends, keeping friends, and being friends to one another are important social goals during childhood and adolescence (Bukowski, Newcomb, & Hartup, 1996; Hartup & Stevens, 1997).

High-quality peer relationships are even associated with positive academic results (Nix, Bierman, Domitrovich, & Gill, 2013). Stable peer relationship potential is expected to be reached despite many changes they would go through in middle childhood, and this is not always evident or an easy goal. Regarding peer ties, there are many dimensions that must be studied, such as the number of peer ties, their quality, and their stability.

Another educational goal for preschoolers is related to their social and emotional development. Supporting children's social and emotional skills and their development is highly important in early childhood education. Empirical studies have shown that positive social and emotional skills indicate children's school readiness (Denham, 2006), academic performance (Walker, Ramsey, & Gresham, 2004), and success in establishing social relationships with other children and adults (Ashiabi, 2007). This has led to increased efforts to provide high-quality early childhood education to foster social and emotional skills and to ameliorate problem behaviors.

This dissertation focuses on understanding children's peer relationships and how they change or stabilize throughout an academic year. It also aims to identify what kinds of prosocial and problem behaviors influence young children's interactions with their peers of varying closeness and how social and emotional interaction is related to peer relationships.

The dissertation is divided into the following sections: introduction, methods, overview of the empirical studies, and findings and discussion. The introduction chapter discusses what is known about children's peer relationships and peer

interactions and how these two are related to each other. The methodology of the studies is presented, the emphasis being on observational instruments and social network analysis. Three empirical studies (i.e., the original articles) are shortly introduced, and finally, the dissertation concludes with a discussion of the main findings. The research design and theoretical, methodological, and practical implications are outlined and special attention is given to the observational tool developed during the thesis project.

## 1.1 Preschoolers' peer relationships

### 1.1.1 Friendships, peer acceptance, and peer preferences

Prior studies have discussed various dimensions of children's peer relationships, such as peer acceptance, sociometric status, likability, peer rejection, and popularity (Cillessen & Marks, 2011). As part of that discussion, researchers have used several concepts to distinguish differences between peer acceptance and friendship. Peer acceptance is understood as a one-way concept and depends on the degree to which a child is liked by peers, whereas a friendship tie is expected to be mutually recognized (Doll, 1996; Rubin, Bukowski, & Parker, 2006). More precisely, Howes and Mueller (1980) noted that a friendship tie should be defined as an affective tie between two children. Friendship includes three necessary components: mutual preference, mutual enjoyment, and the ability to engage in skillful interaction. Unlike non-reciprocal (i.e., asymmetric) ties, reciprocal friendships are characterized by high-quality, dyadic, and positive interactions (Vaughn, Colvin, Azria, Caya, & Krzysik, 2001). In turn, peer acceptance reflects the perspective of the child's peer group and facilitates access to play activities in the classroom (Bukowski & Hoza, 1989). Sebanc, Kearns, Hernandez, and Galvin (2007) indicated that peer acceptance predicts whether children have friends during early childhood. In this study, the term "peer preference" is used to indicate children's own choices in selecting peers to play with. Similarly, mutual likability or friendship indicate bidirectional relationships that require both acceptance and preference between two children. Peer acceptance and likeability are understood as synonyms, likewise peer preference and liking. Various concepts come from different research traditions and most essential in this context is to understand whether these terms indicate a mutual or asymmetric relationships.

### 1.1.2 Stability of peer relationships

Friendship stability has been considered important for several types of social adjustments in childhood and adolescence. First, it is assumed to be associated with

prosocial behaviors and popularity (Berndt, 1999), decreased loneliness (Parker & Seal, 1996), decreased aggression and victimization (Wojslawowicz, Rubin, Burgess, Booth-LaForce, & Rose-Krasnor, 2006), and higher academic skills. It has been assumed that friendship ties formed in early childhood are unstable and transitory. Barron's (2011) study showed that children's friendships with peers are fluid and fleeting, confirming Corsaro's (1994), Nilsen's (2005) and Proulx and Poulin's (2013) research results that children's choice of playmates was constantly changing and only a few exceptional cases were enduring. However, some researchers have indicated that once mutual friendship ties are formed, they show remarkable stability across all age groups. During their preschool years, two-thirds of children who identify one another as friends do so again four to six months later. Reciprocal friendship ties have been shown to be more long-lasting than asymmetric ties (Gershman & Hayes, 1983). Park and Park (2016) found that children can maintain friendship ties over a five-month period. Many other studies have concluded that although kindergarten children can maintain reciprocal friendship ties, unstable ones are more common (Gershman & Hayes, 1983; Ladd, 1990; Ladd & Price, 1987). Proulx and Poulin (2013) conducted a study based on the typology of the friendship stability profile (e.g., stable, fluid, loss, gain, friendless) developed by Wojslawowicz et al. (2006). They found that children in the fluid profile formed more friendships over the year than children in the stable profile, but that there were no significant differences between the loss and gain profiles regarding the total number of friends. Although many researchers have clarified that friendships go through various developmental stages, there seems to be coherent understanding that, overall, children's friendships are sustained through positive, coordinated, and highly charged play, especially fantasy play in dyads or very small groups (Beazidou & Botsoglou, 2016). To conclude, children's mutual relationships have been indicated to increase stability in peer ties. This research is aimed to examine whether these earlier findings can be confirmed in authentic early childhood environment, with many changes to be expected in peer relationships.

## 1.2 Preschoolers' interactions with their peers

Friendship and social interaction among peers have attracted empirical attention (Miller-Slough & Dunsmore, 2016). For example, successful anger management strategies are expected in and essential to maintaining close friendship ties. Previous research has reported on various aggressive, nonaggressive, and ignoring strategies that are used to solve conflicts among peers (MacEvoy & Asher, 2012; Tangney et al., 1996), and it has been found that conflicts between best friends are no shorter or less intense than conflicts between casual peers. However, friendly

interaction is more likely to resume after conflicts between best friends (Hartup, Laursen, Stewart, & Eastenson, 1988). For older age groups, there is some evidence that prosocial behavior towards friends increases from early to mid-adolescence (Padilla-Walker, Carlo, & Nielson, 2015), but overall, there is little evidence regarding the differences between young children's behaviors towards best friends and casual peers. The aim is to combine research traditions that examine peer relationships and children's behavior with their peers, from the perspective of prosocial and problem behavior.

### 1.2.1 Prosocial and problem behaviors

Prosocial behaviors are characterized by feelings of empathy and compassion and by having a positive attitude towards sharing, helping others, making compromises, showing respect, and expressing positive feelings for other children. Fisch, Truglio, and Cole (1999) proposed that friendships, conflict resolution, cooperation, sharing, turn taking, and entering social groups are the most important aspects of social and emotional interactions. Further, children's self-control as a feature of inhibitory control is frequently discussed as one of the prosocial skills that all children must be taught (Diamond, 2012). In their study, Asher, Parker, and Walker (1996) suggested that managing disagreement and resolving conflicts with friends are among the top 10 desirable prosocial skills. Other researchers noted that prosocial behaviors include traits such as following directions and controlling temper with peers (Lane, Givner, & Pierson, 2004). Thus, prosocial behaviors include cooperation, inclusion, giving compliments, and comforting peers (Honig, 2004).

Supporting children's social and emotional skills and development are vitally important in early childhood educational context as positive social and emotional skills are a predictor of school readiness (Denham, 2006), academic performance (Walker, Ramsey, & Gresham, 2004), and success relationship with peers and adults (Ashiabi, 2007). During this period of development, child-directed peer activities provide the context in which preschool children are expected to share, take turns, cooperate, consider others' perspectives, and inhibit aggression. Further, improving prosocial skills and inhibiting problem behaviors should be simultaneously cultivated in children at this age.

It has been indicated that social and emotional problem behaviors, including internal and external problems, appear at an early age (Egger & Angold, 2006). For young children, internal problems are associated with anxiety and depression, and external problems include aggression and impulsivity (Sterba, Prinstein, & Cox, 2007). Externalizing behavior is identified as outward acts of aggression, disruption, and defiance, whereas internalizing behavior is observed as social isolation and depression (Gresham & Elliott, 1990).



Researchers have stated that defining social and emotional problem behaviors in young children is challenging because the occasional minor signs of problem behaviors are considered a normal part of children's development (Carter & Pool, 2012). Most children are also expected to exhibit minor signs of problem behaviors, but severe problems, such as depression, should be more seldom. Nonetheless, problem behaviors in children can become habitual if there is no intervention to teach the child to inhibit these behaviors (Basten et al., 2016). It is, therefore, important to observe and prohibit minor problem behaviors in children to prevent these from degrading into more severe problem behaviors. At current study, it is essential to notice that prosocial behavior and training skills for conflict situations takes place in authentic play environments, together with peers, and not only by following norms given by educators.

### 1.2.2 Initiating and responding behaviors

Children's prosocial and problem behaviors are closely related to interaction and should be understood as a directed action. One way to do so is to categorize interactions as initiating and responding activities and then observe how the child relates to other children in a given situation. In other words, how the child contributes to the interaction and whether he or she starts the interaction (initiating) or continues or replies to an earlier interaction (responding) could indicate a perspective where interaction is seen as directed (Iiskala, Volet, Lehtinen, & Vauras, 2015). Initiating interactions—when the child spontaneously generates the behavior without clear external influence—indicate an active role in peer interactions, whereas responding behavior is a sign of a responsive role because the child's behavior is triggered by another's initiation.

## 1.3 Peer relationships and social and emotional behaviors

Researchers have argued that children's social-emotional skills and peer relationships are developed and enhanced through practice (Denham & Brown, 2010). Also, many interventions, programs, and curricula have been implemented to improve children's social and emotional behaviors and interactions. Positive results based on these interventions have been indicated, such as the Dinosaur School Curriculum (Webster-Stratton, Reid, & Stoolmiller, 2008) and the Preschool Promoting Alternative Thinking Strategies curriculum (Hamre, Pianta, Mashburn, & Downer, 2012). However, early studies also found failures and unexpected results in developmental processes regarding self-regulation, social skills, and emotional recognitions as well as the occasional increase in aggressive

behaviors (Coley, Votruba-Drazal, Miller, & Koury, 2013; Vermeer & Van Ijzendoorn, 2006).

There is a complex connection between children's social and emotional interactions and their peer relationships. Children's behaviors may influence their opportunities to establish social relationships with peers (Lyubomirsky, King, & Diener, 2005). The intensity and quality of children's observed emotions have shown to be predictors of the quality of their social relationships (Hernandez et al., 2017). Whether children are able to participate in prosocial interactions or whether problem behaviors manipulate their daily interactions could predict their abilities to build and maintain ties with their peers. Evidence for this is rich and partly contradictory. In this study, it is one of the main tasks to better understand how children's peer ties, such as friendship ties, influence on the way how they behave when interacting with other children and vice versa, in which way children's behavior is related what is a number and quality of their peer ties.

### 1.3.1 Peer rejection vs. negative social and emotional behaviors

Numerous researchers have shown that low peer acceptance correlates with negative social and emotional behavior (Smith, 2001) and even a higher risk of becoming involved in criminal activities in later life (Hendrickx, Mainhard, Boor-Klip, & Brekelmans, 2017). Rejection is considered to be related to children's problem behaviors, such as disruption, aggression, and being hot tempered (Erwin, 1993; Strand, Barbosa-Leiker, Piedra, & Downs, 2015). Further, negative emotional control, such as anger intensity and frequency, is often associated with peer rejection (Coplan & Bullock, 2012; Erwin, 1993; Hernandez et al., 2017). Likewise, it has been shown that children who have few peer relationships are more likely to be considered aggressive by their peers and teachers (Hymel, Rubin, Rowden, & LeMare, 1990). Children with poor verbal interactions can be at a greater risk for rejection compared to those with high-functioning verbal communication skills (van der Wilt, van der Veen, van Kruistum, & van Oers, 2018). In all, negative emotions and behavior is a well-studied area in science, however, the focus of the current study is not on risk behavior as such but on everyday peer interaction embedded in various phases during early childhood, with its minor conflicts and problems in interaction.

### 1.3.2 Peer acceptance vs. positive social and emotional skills

Similarly, peer acceptance and its relation to prosocial skills have been studied. In Gülay and Onder's (2013) study of five- to six-year-old children, it was found that positive social and emotional skills predict access to peer relationships. Hernandez et al. (2017) also found that better anger control and teacher–student relationships were common among accepted children. Putnam (2012) indicated that positive emotions, having numerous peer relationships, being devoted to friends, and likability are all connected. In all, preschoolers' positive behaviors when interacting with their peers is positively associated with peer acceptance (Gottman, Gonso and Rasmussen, 1975; Shin et al., 2011). Lindsey (2002) found that children with at least one mutual friend were perceived by teachers as more socially competent than their counterparts with no mutual friends.

## 1.4 Gender differences

Gender has always been one of the issues in studying children's friendship and social interactions as gender is believed to determine the frequency and quality of interaction as well as the stability of relationship (Maccoby, 1988). Early researchers have found that although children interact with cross-gender peers, they show a strong preference for same-gender peers (Bredgen, Little, & Krappmann, 2000; Martin & Fabes, 2001). However, the slight difference has been found that boys are somewhat more open to cross-gender interaction than girls (Halim, Ruble, Tamis-LeMonda, Shrout, & Amodio, 2016). In interaction, girls show more prosocial behaviors than boys, such as collaboration and self-regulations (Padilla-Walker, Carlo, & Mommott-Elison, 2017; Veijalainen, Reunamo, & Alijoki, 2017). Boys are found to be more hyperactive and aggressive than girls (Foster, 2005). Thus, there are both similarities and differences between boys and girls in social interactions.

## 1.5 Summary of earlier research

Earlier studies have reported well evidence regarding pre-school aged children's prosocial and problem behavior when playing together with their peers, to help professionals in educational institutes plan, organize and cultivate educational practices. Children's peer relationships are expected to turn more stable in their early years, although this process is not too often described in detail. Further, previous studies provide useful findings in children's peer relationships, especially indicating their gender and age preferences.

The value of mutual friendships has been reported frequently. In all, time and social skills are asked from children to gain stable, mutual and long-lasting friendships and companionship, which in turn predict better success in wellbeing or even academic matters. Less is known how these two, emotional and social behavior, and peer relationships, are related together, although there are some areas in special education literature, such as aggressive behavior or autism that are widely studied. Still, more needs to be known of the complex and interrelated connection between children's social and emotional behavior when they interact in peer groups and how this affects or is influenced by the relationships among peers.

There is also lack of evidence how adults' interference affects peer tie formation or children's behavior in small group situations. Current study aims at adding empirical results regarding how pre-school teachers' daily arrangements and pedagogical interventions in selecting playmates for children enhance, form or break peer relationships, how children's behavior and mutual interaction are associated to their play mates, and how changes in children's peer relationships change in early childhood. Interaction is seen from the attributors' and the receivers' perspectives, i.e. whether children initiate or response interaction. Furthermore, most of the earlier tradition is written from professionals' perspective and the target has mainly been in following adults' norms. More could be asked from children themselves, or observe their activities in authentic environments. However, concrete tools to systematically observe all children's behavior in their authentic environments is requested, not only for those in need of special education and care.

## 2 Study Aim and Research Tasks

The primary goal of this thesis project is to understand how children's peer relationships are constructed, how they evolve, which factors influence this process, and how they are embedded in children's wider social and emotional development. Factors such as gender, age, and group membership may affect children's relationships. Another practical research interest is to investigate children's social and emotional behaviors in small group situations, how these might be observed and classified, and how children's peer relationships are related to these behaviors. Thus, the set of studies aimed to fulfill the following research tasks:

1. The first task was to study how preschoolers' peer relationships vary in relation to age and gender (Studies I and II).

Study I aimed to examine the changes and stability in children's peer relationships during an academic year. More specifically, the focus was on the transitivity, mutuality, and strength of these ties. Further, the aim was to explore how children's gender, age, and daily pedagogical arrangements impact how relationships with their peers are formed and how stable these ties are during the study period.

Study II aimed to assess the closeness of peer relationships (i.e. interactions among the group) depending on if the groups are self-selected or nominated by the teacher.

2. The second task was to observe peer interactions in a small group context and at the individual level. Interactions were studied from the perspectives of prosocial versus problem behaviors and initiating versus responsive interactions (Studies II and III).

Study II focused on observing how children interact with each other in the context of tablet game sessions. The aim was to determine the most common and uncommon prosocial and problem behaviors. Interactions were studied at the group level and further classified as initiating and responding.

Study III expanded the research task to the individual-level perspective.

3. The third task was to study how peer relationships are related to social and emotional interactions (Study III).

Children's ties to their peers were classified based on peer acceptance, peer preference, and mutual liking.

Study III investigated how children's preferences are related to social and emotional behavior, further divided as initiating and responding interactions.

4. The fourth task was to develop methods and design a practical tool for observing peer interactions in small group (Study II).

## 3 Methods

### 3.1 Participants and research settings

#### 3.1.1 Participants

The participants of the current thesis were children enrolled in full-time daycare at a private kindergarten located in the southwestern area of Finland. All 16 children that participated in the study were Finnish-speaking children between the ages of five and six. All children were physically located in the same kindergarten building and took part in the same research project as this was a small-size kindergarten and thus sample was not needed. They also shared the same classroom, although pedagogical guidelines treated them—at least partly—as separate age groups with their own activities. In Finland, activities for six-year-olds are based on pre-primary education, while those for five-year-olds belong to early childhood education and care (Finnish National Board of Education, 2016).

According to the curriculum, pre-primary education aims to promote adequate conditions for children's development and learning, strengthen their social skills, foster healthy self-esteem through play, and encourage positive learning experiences in cooperation with caregivers. In order to promote children's social interactions, teachers have conducted instructions and practical supports for both age groups in daily pedagogical practices. Children were reminded of their behaviors every day in their morning circles or through reading and reflection moments. They were also allowed to freely circulate with children and adults to learn the social skills of interacting with people from different ages, culture backgrounds and characteristics. Furthermore, they were also motivated to cooperate in joint indoor or outdoor activities. Even encountered with conflicts, children were encouraged to solve the problem by themselves, adults intervened only when the situation was out of control.

The study began in the autumn semester and continued until the spring semester ended, except for a one-week break over Christmas, for a total duration of 10 months. Of the 16 children included in the study, four girls and four boys were five years of age, and three girls and five boys were six years of age. Altogether, there were seven girls and nine boys in the whole group. One girl and one boy,

both of whom were six years of age, came to the kindergarten at the beginning of the research period. All the other children had already attended the kindergarten in the previous academic year. This reality might affect the newcomers' activeness in association with peers and also the frequency of initiation behaviors. In Finland, regular education is mandatory for six-year-old children, but not for five-year-old children. Furthermore, some children were occasionally away from kindergarten (e.g., because they were sick) and this influenced the groupings.

### 3.1.2 Arrangements for groupings

Two types of grouping arrangements were utilized in this study: 1) a fixed-table order for daily activities such as eating (for Study I) and 2) changing groupings for game sessions around tablet computers (for Studies II and III).

Fixed-table order was produced by the children's own kindergarten teachers for their daily activities. For the daily activities, the participants were divided into four groups, four children for each table, which did not change during the academic year. In contrast, for the game sessions implemented during the study, the children were divided into groups of three or four children; these groupings changed every second week based on either the children's preferences or according to a teacher-nominated procedure. This turn-taking arrangement was repeated throughout the academic year. In practice, the children tended to vote for same-gender children when it was their turn to make a decision regarding the group. Therefore, the child-preferred groups tended to also be same-gender groups. If there were difficulties choosing exactly four children for a group, the teacher would help the children, for example, by suggesting that one of the children could leave or join the group. In the teacher-nominated groupings, the children were divided into groups with a cross-gender makeup to encourage interaction with casual peers. In Study II, these groups were referred as best friends and casual peers groups.

### 3.1.3 Game sessions around tablet computers

For the whole study, iPads were used in the kindergarten for research sessions. Children were introduced to the iPad and they had thus free access to various tablet games during the research sessions. Outside the research periods, tablets were also integrated into other pedagogical activities and teaching sessions. Early access to the computer and technology among young children has been an issue of debate in recent decades (Chau, 2014; Griffiths, 1997; Heft & Swaminathan, 2002; Shields & Behrman, 2000). Earlier research indicates that, when computer software targeted at children is open-ended and oriented towards problem solving, children tend to engage in creative play and interact with their peers in a positive manner



(Johnson & Christie, 2009; McManis & Gunnewig, 2012; Verenikina & Kervin, 2011). Digital toys appear to have a mixed impact on play. Digital toys can serve as catalysts for new forms of play and can have a positive influence on the content of more traditional forms of play. Regarding digital play, an important issue is how to maximize the positive consequences so that they enrich rather than hinder children's play experiences (Johnson & Christie, 2009). There may not be a clear dichotomy between play and technology in a child's spontaneous play. Regardless, digital play in its various forms has become a part of young children's lives. Therefore, it is important to examine it from the same perspective as traditional forms of play (Couse & Chen, 2010; Sahin, Tas, Ogul, Cilingir, & Keles, 2014). In all, children have shown to be fearless in their interactions with technology (Seiter, 2005).

The application of technical supported study is considered to have the advantage of co-evolve of technology and social infrastructure (Lipponen, 2002). Thus, digital play offers a context of collaboration for this study. For each research session, three or four children shared one tablet computer. All children had a game session approximately every other week. Altogether, 13 sessions were organized, during which 52 x 30 minutes of video data were collected. All children participated in the game sessions on a voluntary basis. If children were absent from the research session, they were allowed to play with the tablet at another point in time. Three weeks prior to data gathering, the children were given the chance to become familiar with the tablet computers. How often children played tablet games at home was not controlled for, as this was not the focus of the study.

It was expected that the tablet computers would create a situation that motivated active social interaction within the group (cf. Mustola, Koivula, Turja, & Laakso, 2018). Tablet gaming was assumed to be an attractive form of group play that would enable children to practice various technical skills needed for the future. Tablet gaming also provided a controlled situation where children sat together instead of running around the room, thereby creating an appropriate environment for recording group interactions for the study.

The children were allowed to discuss among themselves which games they wanted to play and how they wanted to organize the shifts regarding use of the tablet computer. This was organized to initiate situations where collaborative interactions could occur (Lipponen, Hakkarainen, & Paavola, 2004). Children were encouraged to collaborate with their peers while gaming, but solo play was also possible. In order to create a natural context in which to observe the children's peer interaction, teachers were instructed to only become involved in the activity if the children encountered technical problems or were in an unsolvable conflict situation; thus, the teacher's role was passive during the sessions. This was also done to maximize the children's own contributions.

At the beginning of each tablet game session, the teachers explained and emphasized the social and emotional rules and expectations for the children. The children's prosocial behaviors were operationalized in the form of questions and negotiations guided by the teacher (e.g., "Who will be the first to play?" or "How many games can one child play in a row?"), sharing of materials (e.g., "When should the tablet be given to the next player?"), providing help ("Can I help you in here?"), offering positive feedback, and initiating communication by, for instance, asking questions related to the games. In addition, the children were encouraged to be aware of their self-control skills and not to disturb other children during the tablet game sessions. Problem behavior was defined as physical disturbances (e.g., interrupting the game) or verbal opposition (e.g., making an accusation).

### 3.1.4 Units of analysis in sub-studies

#### Study I

Participants in Study I included 16 children ages five and six at the kindergarten. The unit of analysis was a dyad. In all, there were 240 dyad-level ties, with every child having a possible tie to all other 15 children.

#### Study II

The participants of Study II included 15 children, seven girls and eight boys aged five to six years. One child (Antti) is absent from the Study II data because there were not data of four children groups for him due to some changes in data gathering. Only groups of four were used for analysis purposes to ensure that each participant had been allotted with equal amount of time for games; and also to ensure that each one had equal amount of targets for interaction and socialization. The unit of analysis for Study II was at the group level.

#### Study III

For Study III, two analyzing units were utilized: the group level and individual level. Group-level analyses were made from the observational data in which all 16 children participated in the gaming sessions. For individual-level analyses, four children were selected based on peer nominations. Following these ratings, the least liked (Veera) and the most liked (Marita) girl and the least liked (Olavi) and most liked (Asko) boy were selected for further analysis.

## 3.2 Data collection and analysis

This dissertation project utilized multiple sources of data and mixed methods: children's interviews and video data. Interview protocol was repeated five times for all children with an exception of two children, being present only four times. Video data were collected from children's interaction with their peers around tablet computers.

### 3.2.1 Interview data

Interviews were conducted five times altogether during the whole research period with each of the children by the first author. In each interview, children were asked to rate their peers one by one based on the frequencies of association as "always/sometimes/never play with". Peer ratings, in order to study change in tie structure, were analyzed using the Simulation Investigation for Empirical Network Analysis (SIENA) version 3.2 (Snijders, Steglich, Schweinberger, & Huisman, 2008), which has been developed to explore changes in longitudinal network structures. In the analysis, stochastic actor-based models were used to estimate the tie-level changes (Snijders, 2001). In the models, it was expected that individuals could change and select their outgoing ties based on different effects (e.g., reciprocity, belonging to the same group, gender), and these changes could depend on the entire network structure (Snijders, van de Bunt, & Steglich, 2010). The models represent the network dynamics as determined by simultaneously analyzing operating effects and estimated parameters to express the strength of the effects (Daniel, Santos, Antunes, Fernandes, & Vaughn, 2016).

Social network analysis (SNA) has potential to provide a rich picture of peer relationships among children as it can be employed at dyad level. Density, centrality, and centralization were calculated for this purpose. All these analyses were conducted using UCINET software (Harvard, MA: Analytic Technologies), which is a general package for social network analysis. SNA is seen appropriate for analyzing relational data that connects one agent to another regarding their contacts, ties, group attachments and so on (Scott, 1987). Social network analysis was selected also to be able to analyze tie strengths between children.

Density is a basic concept in social network analysis. The density analysis indicated how many nominations were reported by the group of children compared to the maximal number of nominations. The more nominations they reported, the denser the network became (Borgatti, Everett, & Freeman, 2002). Centrality indicated e.g. how many direct connections there were between each node and the other nodes within the network. In other words, centrality specifically explained the number of times a child reported a friend or was reported by their peers as a friend (Borgatti et al., 2002). These outdegree values (given nominations) and

indegree values (received nominations) were later combined with qualitative interaction video data. This kind of mixed method SNA (MMSNA) can be helpful in bridging personal and structural dimensions together (Boliar, 2016).

The SIENA analysis procedure consisted of two general steps. First, changes in the tie level were explored by studying how the children changed their outgoing ties between the two different measurement points. The first time point was used to model the structural changes against the latter time point. Next, the parameters representing structural network effects, such as density (or outdegree ties, basic tendency to have ties), reciprocity (tendency toward mutual ties), transitivity (preference for ties with friends of one's friends, allowing reciprocity), and three cycles (tendency to build triads where the ties are not reciprocated), were estimated simultaneously. A transitive triplet effect and a three-cycle effect generally indicated a tendency to befriend the friends of one's friends. Unlike the three-cycle effect, the transitive ties effect assumes some reciprocated friendship nominations. The positive transitive triplets estimate and negative three-cycle estimate indicated transitive closure in the friendship network, including increasing reciprocity (Baerveldt, van de Bunt, & Vermande, 2014). In practice, this meant that some asymmetric ties faded away while others became reciprocal. In the estimation, the effects of three covariates—gender (girl or boy), daily activity group (indicating the table order in the kindergarten), and age (five-year-olds and six-year-olds)—acted as unchangeable attributes for the analyses. For these attributes, the estimation model examined the similarity effect (Sijtsema et al., 2010; Steglich, Snijders, & West, 2006) using the maximum likelihood method. This method is considered suitable for small network data, and there were no model assumptions concerning the first observed network structure (Snijders, Koskinen, & Schweinberger, 2010)

### 3.2.2 Video data

For Studies II and III, ELAN annotation software (Max Planck Institute for Psycholinguistics, Nijmegen, the Netherlands; Wittenburg, Brugman, Russel, Klassmann, & Sloetjes, 2006) was used to analyze the observational data of children's interactions. Peer interaction in this study was classified by a peer interaction observation tool (PIOT), which is based on the preschool version of the Social Skills Improvement System (SSIS) Rating Scales (Gresham & Elliott, 1990) and was developed for the purpose of this study project because of the main emphasis on small group-level interactions. According to SSIS, prosocial behaviors are divided into seven categories: cooperation, assertion, responsibility, self-control, communication, engagement, and empathy. The structure of problem behaviors in SSIS is divided into five categories: externalizing, bullying, hyperactivity/

inattention, internalizing, and the autism spectrum. However, those dimensions of SSIS that were not directly linked to peer interaction, that were difficult to track in video analysis, or that indicated internalizing problems (e.g., dimensions related to the autism spectrum) were excluded from PIOT. Further, the categories were divided into prosocial initiating/responding behaviors and problem initiating/responding behaviors. The final PIOT tool is presented in Table 1 (Wang, Kajamies, Hurme, Kinos, & Palonen, 2018).

**Table 1.** PIOT

<b><i>Subcategories of prosocial behavior</i></b>	<b><i>Description or example in real-life situation</i></b>
<b><i>Initiating</i></b>	
1. Provides verbal help	Offers advice
2. Provides concrete help	Shows a peer/peers what to do
3. Initiates conversation	Starts a new topic or asks a question
4. Invites a peer	Says, for example, "Would you like to play with me?"
5. Takes responsibility	Suggests how to make the activity go smoothly
6. Follows the rules	Takes turns as agreed
7. Speaks politely	Says "please" or "thank you"
8. Praises a peer	Says "that's good," "great," or "nice"
<b><i>Responding</i></b>	
1. Accepts verbal help	Plays as suggested or advised
2. Accepts concrete help	Allows a peer to contribute in play
3. Replies to a peer	Reacts to a peer's question
4. Stands up for a peer	Helps a peer who is treated unfairly
5. Solves a problem verbally	Handles a problem by saying something calmly
6. Ignores distraction	Ignores a peer when he or she interrupts or distracts
7. Stays calm	Is calm when teased
<b><i>Subcategories of problem behavior</i></b>	<b><i>Description or example in real-life situation</i></b>
<b><i>Initiating</i></b>	
1. Acts impulsively	Has difficulty waiting for his or her turn
2. Bullies	Annoys a peer and enjoys when the peer gets upset
3. Forces a peer	Makes a peer act against his or her will
4. Excludes a peer	Keeps a peer out of activity
<b><i>Responding</i></b>	
1. Accuses a peer	Blames a peer whenever a problem occurs
2. Is aggressive	Hits or hurts a peer physically
3. Has temper tantrums	Shouts or gets angry
4. Is inattentive	Is distracted, for example, stares at something else

In order to utilize a mixed method approach, the frequencies collected with the PIOT instrument were further analyzed using social network analysis methods. Thus, it was possible to analyze how observed behavior was distributed among children playing in the same group (i.e., to study density and centralization of interaction for each game session). All density analyses at the individual and group levels were conducted using UCINET software.

For Study III, both peer ratings and data related to interaction frequencies were analyzed with the UCINET software. For both Studies II and III, nine video clips collected from all 16 participants were analyzed. The selection criteria for the videos was to observe peer interactions at the beginning, middle, and end of the academic year. These data included both child-preferred and teacher-nominated groups.

In Study III, participants for video analysis were selected from two steps. First, we analyzed all 16 participants from two different types of sessions: (1) where the group members were selected by the children themselves and (2) where the group members were selected by the teacher. Second, four children (one least-liked girl, one least-liked boy and one most-liked girl, one most-liked boy based on the in-degree level of peer rating) were selected for in-depth individual-level analyses. Furthermore, descriptive statistical analyses and Spearman correlation measures between children's social behavior and ratings were calculated to study how these two are related.

### 3.3 Summary of the method

In order to provide an overall picture of the methodological decisions made within this dissertation, the overview of the sub-studies can be seen in Table 2.

**Table 2.** Overview of Sub-studies

Study	Research aim	Participants and unit of analysis	Methods	Data sets	Data analysis
I	<p>To examine the stability, mutuality and transitivity of peer relationship;</p> <p>To examine the influence of gender, age and daily pedagogical arrangement on peer relationship</p>	16 five- to six-year-old children (dyad level ties N=240)	Interviews with peer nominations	Sociometric peer nominations, repeated at five time points	<p>Tie-level changes of outgoing ties between different measurement points;</p> <p>Density, reciprocity, transitivity and 3-cycles of children's nominations with Social network analysis with Ucinet and SIENA</p>
II	<p>To identify the most typical and most rare social behaviors;</p> <p>To explore how they differ regarding genders and closeness of friendships</p>	15 five- to six-year-old children (group level 9×30 videos)	Video observations of children's interactions	9 video recordings including 3 girls' groups, 3 boys' groups and 3 cross-gender groups from the beginning, middle and end of research period	<p>Coding the frequency of children's interactions with PIOT observational tool using Elan annotation software;</p> <p>Density and centralization of interaction with social network analysis</p>
III	<p>To explore the correlation between peer ties and peer interactions;</p> <p>To study the difference of interactions in individual level</p>	16 five- to six-year-old children (individual level N=240; individual level 11×30 videos)	<p>Sociometric peer nominations;</p> <p>Observations of children's interactions in small groups around computer</p>	<p>5 Sociometric nominations;</p> <p>11 video recordings from three time points;</p> <p>Individual follow up of four children</p>	<p>Degree centrality with social network analysis using Ucinet; comparisons of interaction between best friends and casual friends;</p> <p>In-depth individual analysis for least-liked and most-liked children's development with Elan annotation software;</p> <p>Descriptive analyses and Spearman's ranking order correlation measures of the peer relations and interactions</p>

## 4 Overview of the Empirical Studies

In the following overview, three empirical studies reported in the three articles are briefly described regarding the research questions posed in this dissertation.

### 4.1 Study I

**Wang, Y.-L., Palonen, T., Hurme, T.-R., & Kinos, J. (2019). Do you want to play with me today? Friendship stability among preschool children. *European Early Childhood Education Research Journal*, 27, 170–184. doi:10.1080/1350293X.2019.1579545**

Children's capability to establish peer relationships is an important issue in early childhood education. Making and maintaining friendships promotes children's social skills development. The purpose of Study I was to examine the transitivity, mutuality, and stability of five- and six-year-old children's peer relationships over one preschool academic year.

Participants included all 16 five- to six-year-old children in a southwestern Finnish preschool. The data consisted of interviews with the children (80 total) conducted at five separate time points using sociometric nomination techniques. The unit of analysis was a dyad ( $N = 240$  dyad-level ties, with every child having a possible tie to all other 15 children). Sociometric nominations were collected in the form of interviews with the application of a three-point Likert scale ("I never want to play with this child," "I sometimes want to play with this child," and "I always want to play with this child"). Social network analysis was used to investigate the nature and change in the children's peer relationships in relation to gender segregation, age differences, and variations in groupings.

The results of the study showed that in general, children's relationship ties varied during the academic year. The density of children's strong ties (when children rated others as always wanting to play) decreased towards the end of the study. Dyad-level changes were found in the study. The number of no-ties (both children rated each other as never wanting to play with each other) increased by the end, and steady ties (both rated each other as sometimes or always wanting to play with each other) increased throughout the academic year. The results also showed



that most of the changes occurred during the beginning of the year and tended to be consistent towards the end of the year. Thus, the distance between different ties, which indicated the volume of the changes, was lowest at the end of the year.

The study contributes to the extant literature by elaborating how the children's friendship ties stabilized over one year. It also found that children sought to establish stable and mutual relationships instead of extending their social relationship ties randomly. Moreover, children also exhibited a stronger preference for gender segregation than age similarity. Daily pedagogical arrangements in the form of a seating order showed little influence on peer relationships.

## 4.2 Study II

**Wang, Y.-L., Kajamies, A., Hurme, T.-R., Kinos, J., & Palonen, T. (2018). Now it's your turn: Preschool children's social and emotional interaction in small groups. *Journal of Early Childhood Education Research*, 7(2), 255-281.**

There is concern regarding social and emotional skill development in early childhood settings. The aim of this systematic observational study was to examine children's prosocial and problem behaviors in small group settings. Specifically, how gender and closeness of friendships affected children's group-level behaviors was studied.

The participants of Study II included 15 kindergarten children ages five and six who were divided into groups of four based on two selections: child-preferred groups (where children selected their playmates) and teacher-nominated groups (where the teacher nominated children's playmates). Altogether, nine video recordings were coded to observe peer interactions among the children during tablet game sessions. The recordings were coded with a modified version of the SSIS Rating Scale and a combination of initiating and responding behaviors. Altogether, four different categories of children's social and emotional behaviors were formed: prosocial initiating behaviors, prosocial responding behaviors, problem initiating behaviors, and problem responding behaviors. Based on the frequencies of children's social and emotional behaviors, social network analysis was employed to analyze the density and centrality of the interactions at the small group level.

The results showed a wide variety of frequencies in different behaviors. In all, prosocial behaviors were four times more likely than problem behaviors, and there were more initiating than responding behaviors. The most typical initiating prosocial behaviors were providing verbal help and initiating conversation, and the most typical prosocial responding ones were replying to a peer and staying calm. Unlike prosocial behaviors, which were often verbal, most problem behaviors were

nonverbal, and the most common one was acting impulsively. Regarding the comparison between children's interactions with their best friends and their casual peers, the results showed that boys contributed more to both prosocial and problem behaviors than girls. Furthermore, it was also found that children's interactions were most centralized around problem behaviors, which indicated that certain children in the group dominated the interaction of certain behaviors. Regarding problem behaviors, cohesion and centralization were more dominated than prosocial behaviors.

Our results showed that children behaved more actively when associating with their best friends than their casual peers, regardless of whether they demonstrated prosocial or problem behaviors. It was also indicated that children's social and emotional skills are dynamic and interrelated. Initiated interaction affected peers' responses. Another main contribution of the current study was the creation of a practical and concise tool, PIOT, which can be used to study children's social and emotional skills in peer interactions during daily kindergarten work.

### 4.3 Study III

**Wang, Y.-L., Kajamies, A., Hurme, T.-R. & Palonen, T. Together with my playmates: Preschoolers' liking ties and interactions in small group settings. (Unpublished manuscript.)**

Social and emotional learning refers to a process in which children learn and apply knowledge to understand and manage their emotions, set and achieve positive goals, and establish and maintain peer relationships. Peer relationships are believed to be related to children's social competence and behavioral skills. The purpose of this study was to investigate how exactly children's peer relationships and mutual likeability corresponded with their social and emotional interactions; in addition, we also studied how children's social and emotional interactions varied during the academic year.

The participants of Study III included 16 five- to six-year-old children from one full-time daycare center. Sociometric ratings and video-recorded peer interactions were used for data collection and were analyzed by social network methods and the PIOT observational tool. For the social network analyses, all five sociometric nominations were summed up based on children's ingoing, outgoing, and mutual ties to an indicated child's peer acceptance, peer preference, and mutual likeability. Participants were selected for the video analysis using two steps. First, we analyzed all 16 participants in two different types of sessions: (1) where the group members were selected by the children themselves and (2) where the group members were selected by the teacher. Second, four children, the least liked and

most liked girl and boy based on the sums of indegree values in peer ratings, were selected for in-depth individual-level analyses. Altogether, 11 video clips (30 minutes each) were utilized to scrutinize interaction trends among these children over six months from November to May. Sessions were chosen from the beginning, middle, and end of the research period. These data were analyzed with division of prosocial initiating behaviors, prosocial responding behaviors, problem initiating behaviors, and problem responding behaviors as defined by the PIOT tool. Descriptive statistical analyses and Spearman correlation measures between children's social behaviors and peer relationships were calculated.

Our results showed that prosocial interactions were about three times more common than problem behaviors when measured in mean values of frequencies. Problem interactions were unevenly distributed among the children compared to prosocial behaviors, which indicates that some children within the group dominated the problem behaviors. Regarding peer ratings in likeability, peer preferences (i.e., children's self-reports) differed more than peer acceptance (i.e., children's peer reports). Consequently, some children were more eager to report peer ties than others, and this difference was greater than the difference in observed likeability (i.e., variance in peer acceptance).

The statistical results showed that there was no significant correlation between children's peer acceptance and their prosocial behaviors, whereas a statistically significant difference was found between peer preferences and problem initiating behaviors. Consequently, there was also a correlation between peer preferences and the sum of children's problem behaviors. There appeared to be a correlation between reporting liking ties towards peers and initiating an interaction with peers. The individual-level analysis of children's social and emotional behaviors revealed no developmental trends in children's interactions.

# 5 Main Findings and Discussion

This section begins with a summary of the overall aim of the current dissertation. Then the main findings from the three empirical studies are summarized and presented. In addition, methodological and practical implications are discussed. The limitations of the study as well as considerations for future studies are outlined.

Many theoretical concepts are used in the study, which can be explained by several theoretical and methodological perspectives for the topic. There is for example lack of research concerning the complex and interrelated connection between children's social interactions with their peers. Furthermore, not enough evidence has been found to know how adults' interference affects children's peer relationship formation and social behaviors in small group settings. Most importantly, not too much earlier studies are conducted from the children's point of view and in authentic kindergarten context. Therefore, the current dissertation is aimed at deepening our understanding of kindergarten children's social and emotional behaviors, their social relationship formation, changes in peer ties, and the interdependence between these elements.

The first aim was to explore the changes in and stability of children's social relationships over one academic year. The transitivity and mutuality of the ties and tie strength, indicating closeness between the children, were also examined. The second aim was to observe and analyze children's social and emotional interactions with their peers in small group settings within the context of playing tablet games. Children's interactions were studied both at the group and individual level. The third aim was to investigate how children's social and emotional behaviors were related to their peer relationships. Furthermore, a tool for observing children's interactions in a small group context for real-life kindergarten situations was developed.

## 5.1 Peer relationships among preschoolers

The results from Study I indicated that children's peer relationships stabilized throughout the academic year. This conclusion further elaborates earlier results (e.g., Ladd, 1990; Nilsen, 2004), which assumed at a very general level that children's relationships tend to be temporary, or "fluid" (Corsaro, 1994). The

current study contributed in investigating different types of peer ties. The study revealed that based on liking ties nominated by the children, they little by little narrowed the repertoire of play mate choices. Thus, children's non-friends and mutual friends increased over the academic year. In line with van Hoogdalem, Singer, Wijngaards, and Heesbeen (2012), children demonstrated an increasing preference for choosing specific peers to associate with and befriend. Reciprocal peer relationships have been shown to be more stable and long-lasting than non-reciprocal relationships (Gershman & Hayes, 1983). Stable peer relationships are, in turn, a key for creating a participatory culture to guarantee children's psychological and social welfare in kindergarten education and care as well as in their school adjustment.

As expected, most of the closest peer ties were found within age and gender groups. Thus, the results provide evidence for homophily, such as same gender groups (McPherson, Smith-Lovin, & Cook, 2001). One of the main contributions is the notion of transitivity, meaning the tendency to befriend the friends of one's friends, which increased with reciprocity. Gender and age alone did not lead to this change; rather, it was achieved through increasing mutuality and daily pedagogical arrangements made by teachers. This result is also in accordance with earlier studies that found that through physical and emotional classroom activities, teachers might help children to form relationships (Kemple & Hartle, 1997) as well as a sense of belonging to a group or community (Koivula & Hännikäinen, 2016). However, it is difficult to see how influential these pedagogical practices might be if children are mainly kept in same-gender and same-age groups in their daily routines.

In Study II, the impact of peer relationship closeness on children's behavior was studied. It was found that the closer the children's mutual relationships were, the more frequently prosocial and problem interactions were observed. In other words, children were more active in groups where members were selected by the children themselves than in casual peer groups nominated by teachers. Regarding prosocial and problem interactions, it was observed that both types of behaviors were much more frequent when children played with their best friends than with their casual peers. Regarding initiating and responding behaviors, it was found that children were three times more likely to interact with their best friends than with casual peers, both in terms of initiating and responding to prosocial behaviors. Children were almost five times as likely to initiate problem behaviors with their best friends than with their casual peers, and responding to problem behaviors was observed twice as frequently with best friends than with casual peers. This partly unexpected result indicates that children are most active when they play with their closest peers.

## 5.2 Children's peer interactions in small groups and at the individual level

During the study project, the groups of preschoolers were observed around tablet computers in a motivating environment with many possibilities for prosocial and problem behaviors with peers. Over one academic year, how children interacted in various group constructions and whether the groups differed in relation to cohesion and centralization of interaction (i.e., children dominating peer interactions in groups) were studied. The main contribution of the study was to analyze children's behaviors based on various combinations of prosocial/problem behaviors and initiating/responding behaviors (Iiskala et al., 2015). Children's social interactions are dynamic and interrelated, meaning that how a child initiates a behavior influences how other children respond to it and vice versa. Given this, it was expected that responding to certain situations is dependent on how the interaction is initiated. Presumably, children behave in various ways depending on the group atmosphere or the "chemistry" between them. For example, initiating prosocial behaviors is related to children's trustworthiness, and girls are perceived to be more trustworthy than boys (Malti, Chaparro, Zuffiano, & Colasante, 2016). The dynamic nature of children's social and emotional skills also defines the need to follow interaction dynamics during long-term group processes.

Based on the group-level comparison and analysis, interactions were evaluated to determine the most common and uncommon behaviors in the group. Our encouraging finding was that prosocial behaviors were much more common than problem behaviors across all the groups. The positivity of peer interactions highlights the great learning potential in young children's peer interactions that has also been noticed in other studies (Kankaanranta, Koivula, Laakso, & Mustola, 2017; Sylva, Ereky-Stevens, Pastori, Slot, & Lerkkanen, 2016). In our study, children frequently provided help and participated in conversations with their peers. The most common problem behavior observed was acting impulsively. This points to the need for supporting for young children's self-control, as pointed out also in previous studies (Diamond, 2012; Whitebread, 2014). It was found that among the prosocial behaviors, initiating interactions were verbal, but this was not as true for responding behaviors. Further, most problem behaviors were nonverbal.

Regarding individual-level analyses, a closer examination focused on the two most liked and least liked children, two girls and two boys. Peer acceptance did not seem to have a remarkable influence on children's behaviors. Once again, the difference in gender was the most visible result. The results revealed that both prosocial and problem behaviors varied during the follow-up, with a more pronounced variation for the boys than for the girls. Most observations represented initiating interactions. In particular, problem responding interactions were rare.

This is partly understandable because an initiating interaction is a prerequisite for a responding interaction, and thus, these observations are nested by their definition.

### 5.3 Effect of peer relationships on social and emotional interactions

The third research task was to study how children's social and emotional behaviors and their peer relationships are related. Unexpectedly, the results showed correlations between children's peer preferences and problem behaviors. Initiating interactions were especially typical for those children who indicated the most peer ties (i.e., had a high level of peer preference). Receiving liking ties (i.e., peer acceptance), however, did not correlate with either prosocial or problem interactions. Thus, the most liked children did not behave better than their peers, which is not in line with earlier studies (e.g., Hernandez et al., 2017). With regard to the number of mutual liking ties, some correlation was found between prosocial initiating, problem initiating, and sum of problem interactions. Based on the results, active children seemed to have more reciprocal ties than other children. Thus, those children who were sources of problem interactions during play showed the most interest in different peers, and conversely, the children with less initiating interactions reported less interest in playmates. This result indicates partly conflicting signs of what we understand to be social interaction.

Researchers in earlier studies have found somewhat conflicting results regarding correlations between children's peer acceptance and their emotional intensity (Hendrickx et al., 2017; Fabes, Hanish, Martin, Moss, & Reesing, 2012). The present study seems to imply that a child who endeavors to establish a peer relationship does not merely engage in positive social and emotional interactions but is also involved in negative ones. Activeness of any kind may be a good start for social and emotional interactions with peers. Among the participants, there was, however, not any child who would have been at extremely low level in peer acceptance (i.e., being rejected), and thus the variation in peer status among the subjects was moderate. More generally and like Lindsey's (2002) study indicated children with no mutual ties differ from those with even one mutual friendship tie regarding their social and emotional skills.

### 5.4 Development of the observational and practical tool (PIOT)

One of the main contributions of this research project was the development of the observational PIOT. Understanding children's social and emotional skills and knowing how children may behave differently in various social settings is crucial

and should be a baseline for systematic planning when educational goals are confirmed. The purpose of social and emotional skills assessments of individual children is to identify the problems or risks at an individual and group level. This allows for children's progress in kindergarten settings to be tracked and provides a portrait of young children's social and emotional development (Darling-Churchill & Lippman, 2016). The observation model implemented in the present study contributes to the identification of children's social and emotional skills in these situations. This kind of collective information can also give teachers a comprehensive view of children's prosocial and problem behaviors in real-life situations.

The aim was to collect information regarding real-life observations from children's group activities to improve the accuracy and efficiency of the observations. This took the form of a simple observation list that can be used by any kindergarten teacher to follow children's social and emotional skill development. Modifications to the tool were made from a context-bound perspective to make the list implementable for daily preschool situations. In spite of the tightly defined context in this study (i.e., indoor tablet game activities), the PIOT can be implemented for various other activities that encourage children to focus on interacting with other children. It is clear that considerations must always be taken before implementing any new tool. Good quality and practical usability are preferred (Darling-Churchill & Lippman, 2016). With PIOT, a teacher can conduct observations embedded in the pedagogical arrangements at hand whenever children interact with each other. Even if the tool does not offer a standardized scale, it provides a systemic view for observing behavior in group situations. Based on repeated observations of interaction patterns in the student groups, the teacher can develop a deeper understanding of both the strengths and challenges in the groups.

## 5.5 Methodological contributions

One of the methodological strengths of this dissertation is the application of mixed methods involving both quantitative and qualitative data collection and analysis. In Study I, sociometric data were collected and social network analyses were conducted. In Studies II and III, systematic qualitative video analyses were used as the basis for the quantitative result summaries. Both of the methodological instruments and tool kits served as preparation for the further statistical analyses in Study III.

Another methodological contribution of the study is the application of social network analyses to describe the volume or share of ties, which are peer relationships among the children, in terms of their density and centralization (the



distribution of the ties among the children) and how the ties changed during the academic year (e.g., de Guzman, Carlo, Ontai, Koller, & Knight, 2004; Vu & Locke, 2014). For this purpose, UCINET software was first used to analyze both individual and group-level densities (Borgatti et al., 2002). Then, SIENA modeling was applied to simultaneously determine the influence of gender, age, and daily activities as actor attributes, thereby revealing the structural changes in children's peer relationships (Wojslawowicz et al., 2006). The methods used made it possible to analyze both symmetric and asymmetric peer relationships, which Hayes Gershman, and Bolin (1980) considered to be important friendship features from a methodological viewpoint.

To address the methodological challenge of conducting research from primary sources, we utilized video recordings to analyze children's behaviors by observing their peer interactions. The videos and the professional program ELAN were applied as powerful methods to explore children's peer interactions. Video data, in combination with the ELAN software, enabled in-depth understanding of children's social and emotional behaviors within different group settings.

## 5.6 Trustworthiness of the study

For the ethical reasons, parental consents were obtained. The purpose of the study and the arrangements needed for it were explained to the parents by the author at a parents' evening organized before the study. None of the families refused to participate and all signed the informed consent document (Helseth & Slettebo, 2004). The topic of the study was also discussed weekly with the children. Pseudonyms of children's names have been used while reporting, and their personal information has thus been kept confidential. The children participated on a voluntary basis; the children could choose whether or not to be interviewed or recorded, and they were free to leave the recording sessions if they felt uncomfortable.

Parkinson (2001) advocated that researchers should apply a child-friendly design when exploring data about children. Roose and Rutanen (2014) also pointed out the significance of building trust and familiarization with children. Thus, all data was collected by the author, who was also one of the children's kindergarten teachers and worked full-time for the daycare center during the whole research project. This rapport between the author and the children was to ensure the child-friendly environment to minimize children's fear and reluctance. It was also important that the author knew the children well enough to handle the unexpected situations encountered during the data collection.

For interview data, children were interviewed one by one in a vacant room to avoid distraction and to keep the interview comfortable and confidential. At the

beginning of the interview, a short period of free chatting was conducted between the author and the child to facilitate children's setting-in phase. Thompson and Randolph (2000) have advocated the use of simple and clear language in explaining things to the children. Thus, the author explained the purpose of the study as well as asked the interview questions in a child-accessible way.

Capello (2005) suggested using photo interviews to inspire children. Hence, interview data, including peer ratings, was collected by showing each child a photograph of each of their peers. Each child was asked to tell the name of the child in photo to ensure that they knew exactly the target child. Children were also reminded of different settings of daily activities to help them to remember better. This was done to increase the trustworthiness of the interview data, especially when the replies relied on memories about the past events (Baker-Ward & Ornstein, 2000). Furthermore, the definitions of "never", "sometimes" and "always" were explained to each participant in child-accessible way before asking children to rate. All these interviews and the video recordings were conducted by the author. Both sets of data were well reserved so that they would not be released to anyone outside the research group. This was especially important since the interview data was about sensitive peer ratings (Ljusberg, Brodin, & Lindstrand, 2007).

To increase the validity of the current study, the understandings of children's peer relationships have been generated by children instead of adults to avoid adult biased data. Sociometric ratings have been validated by early researchers (Asher & Dodge, 1986). For group selection, the author had discussed with other kindergarten teachers who had also paid close attention to children's social interactions for a better understanding of their peer relationship. In addition, children were allowed to select their own playmates based on their preference. Early researchers have pointed out that adults tended to believe that they understand children, however this might not be the case (Buchwald, Schantz-Laursen, & Delmar, 2009). Therefore, the research design and methods applied in current study were tailored at understanding children's peer relationship and social interactions from children's point of view.

Furthermore, considering the validity of the research, the context of the video data collection was also designed in a real-life kindergarten situation to capture the dynamic quality of interactions (Pepler & Craig, 1998). Video data was used to capture the children's behavior, thoughts and feelings (Moinian, 2006). As the rapport between children and the author had been established, cameras played a role as silent audience (Noyes, 2004). In addition, video data allowed for an in-depth observation of children's verbal and nonverbal behavior dynamics (Joseph, Griffin, & Sullivan, 2000). Thus, video clips provided authentic data from children themselves. To both ensure the naturalistic observation and minimize the limitation of inadequacy of not viewing all group participants simultaneously (Fagot &

Hagen 1988), the recording sessions were facilitated with games to ensure children to be seated closely within a small group. The author had ensured that all children were familiarized with the recording facilities and the tablet games beforehand so as to avoid their anxiety in real recording.

During the recording, the author, also as one of the kindergarten teachers, was in charge of the research sessions and was positioned in the same room with the children. The main aim of the first author's being present was to provide technical support and control over the cameras. For data analysis, together with the other members of the research group, the author discussed and refined the selection criteria of video clips to enhance the reliability of the data; when referring to the data coding, agreement has been reached regarding the criteria, e.g. the types and frequencies of children's behaviors. All these procedures were completed to ensure the reliability of the study results. Furthermore, PIOT was created by the author under the guidance and support of other members of the research group. During all procedures of the research, the author has been aware of her dual-role in designing, data collection and data analysis. The objectivity concerning the researcher's role has also been supported by other members of the research group. In addition, all ethical procedures have been strictly complied with as a vital practice for the dual-role researchers to eliminate the potential ethical pitfalls (Loftin, Campanella, & Gilbert, 2011).

Another point added to the validity of the study was the application of one-academic-year longitudinal data to follow children's change of peer relationship and social interaction skills. Data and results in longitudinal studies were expected to be more valuable in producing more valid and original insights (Avramidis, Strogilos, Aroni, & Kantaraki, 2017). The long-term data collection deepened our understanding of how children's peer relationship changed throughout one academic year and it also provided detailed data on how children's prosocial, problem, initiating and responding behaviors differed in different group settings during the game sessions.

## 5.7 Practical implications

This chapter summarizes the main practical implications of the sub-studies. As the study projects were designed in a practice-based environment and as part of a real-life context in an authentic kindergarten environment, the significance and reliability of practical implications were already taken into consideration during the planning stages. In Finland, small children's pedagogical activities are based on small groups and children use certain period of the day in stable groups because they eat and have morning circles in fixed tables. For the authentic atmosphere of current study, apart from the daily groupings and gaming groups around the

computer, no special pedagogical arrangements have been conducted to support children's peer relationships. This has been designed to minimize the confusion resulting from a mixture of pedagogical arrangements.

The results of the study project showed that stable group arrangement has slight influences on children's relationship formation. Still, further studies are needed and no specific pedagogical instruction is given here. Yet, presumable children themselves should be allowed to influence with whom and how often they play with their peers, also the closest ones. It is wise to support and maintain the relationships that children have already formed by themselves. Kindergarten teachers should contribute in making appropriate arrangements to encourage peer relationship formation. For example, children who do not usually associate with each other can be put in the same group with a common friend who may be the agent to inspire the other children's involvement in the jointly shared activities. This could lead to new relationships later on, based on the transitivity principle. Regardless of the fact that children interact less with casual peers, they could still benefit from interacting with them. Teachers and professionals on the field of education should be aware of benefits of various kinds of arrangements for children's development. Further, any teacher could implement regular grouping arrangements as long as there are enough children for small groups.

This study showed that children behaved more actively when interacting with their best friends as compared to their casual peers. Children were more involved with both prosocial and problem behaviors when interacting with their best friends. This also highlights the significance of children's free will when selecting their company for play sessions, which teachers should take into consideration and respect. The present study thus has an important message for teachers and educators as well as parents in and outside Finland to not intervene in children's friendship formation but rather consider their needs and preferences. For example, parents and teachers in China typically appoint friends for their children after selecting and singling out the "less qualified" peers. This ensures that all peers with whom their children associate are well-behaved and well-educated so as not to exert a negative impact on their children. This PhD thesis project, however, shows that children's selection processes are not exclusively based upon behavioral performance during interactions. Children behave freely and even negatively towards their peers, especially those who are their friends. In this way, they develop their social and emotional skills as a part of play, interacting with others rather than passively being present in the group or playing solo within the same physical environment.

In addition, the fluctuations in the friendship structures during the academic year provide important knowledge about how friendship ties are stabilized, little by little. The adults should encourage all children, especially those who are excluded

or withdrawn, to participate in play sessions and to familiarize themselves with other peers. This may be done by grouping the children sometimes into joint activities based on the same interests and needs. Teachers should do this carefully to stimulate children's interactions by listening to their needs beforehand and respecting children's own opinions and interests from a child-centered perspective. Engagement with different groups and peers might encourage children to develop various roles and identities in different groupings, to apply their social and emotional skills, and to learn that participation is for everyone (Hännikäinen & Rasku-Puttonen, 2010).

One important practical implication of the study is in the creation of pedagogical guidelines to assist children's development of social and emotional skills in early childhood settings, especially in kindergarten, where children have multiple chances to interact with others freely. By doing so, teachers should be able to create a secure social environment for children (Van den Bossche, Gijsselaers, Segers, & Kirschner, 2006). During possible conflict situations, teachers should either allow children to find the solution by themselves or intervene according to the situation. In practice, it is challenging for teachers to decide when and how to facilitate children's social interactions (Littleton & Whitelock, 2005). It is important to understand children's social and emotional skills in a small group interaction context, which was the purpose of creating the PIOT. Although video recordings cannot be organized as a part of daily practices, these might be helpful in certain situations to gain a deeper understanding of children's social and emotional skills or the atmosphere in a particular small group. Based on these analyses, it might be easier to decide whether further intervention is necessary for a child or not. This can also help teachers to develop practices that encourage children to initiate interactions in groups.

Children's active participation should be encouraged by teachers because it is positively related to their formation of peer relationship. The results showed that the act of liking another child as an expression of social behavior is apparently assessed differently by children than by adults, who tend to dominate and set norms for what kinds of interactions are socially desirable. Further, children who reported most play mates in this study, presented more problem initiating interactions during the play sessions than other children. Thus, those children who are sources of problem interactions during play showed the most interest in different peers, and controversially, the children with less initiating interactions reported less interest in playmates. Teachers could stress children's participation and initiating through organizing for example a collaborative environment with a computer-supported context. In this context, genuine need and desire to collaborate of the children who do not initiate interaction could be supported to communicate with the using of technology (Lipponen, Rahikainen, Hakkarainen, & Palonen, 2002). Teachers can

make group arrangements to boost children's initiating behaviors and prosocial interaction and at the same, to influence the structure of the social relationships among the children.

## 5.8 Challenges for future studies

The empirical data were collected from one kindergarten class with 16 children, which did not provide a large dataset. Therefore, to improve the reliability and generalizability of the results, more children should be recruited from different kindergartens. Employing more children with more heterogeneous backgrounds and age groups would increase our understanding of children's interactions and peer relationships in early childhood contexts.

Collecting systematic data in an authentic environment is challenging for researchers. For example, children's activities and settings change frequently, and they might be absent from kindergarten occasionally; these circumstances may cause difficulties and challenges to collecting consistent data. Inconsistency, in turn, causes problems for data analysis and decreases the validity of the results. Therefore, it is necessary to make detailed and specific plans beforehand and to prepare for and consider potential solutions for possible unexpected occurrences.

Inter-rater reliability of the video analyses was not evaluated in the current study. For future studies, conducting inter-rater reliability analyses is recommended to evaluate the reliability of the data utilization in qualitative research.

No follow-up studies were conducted to see whether and how the peer relationships changed after the children attended primary school. Further exploration might help to provide more information on how long and how stable early childhood friendships are and what kinds of circumstances influence them later on.

The PIOT was created for the indoor activities and in small groups. More testing is needed in different contexts, such as outdoor environments and under the lead of kindergarten teachers, to utilize it in wider context. Maybe it would be better to not restrict children's activities to a certain space. There are also many other possible directions how the PIOT could be utilized.

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